RESEARCH COMMUNICATION

# HPV Vaccine Acceptability among Women in the Philippines

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## Abstract

**Aim: To examine attitudes toward and acceptability of HPV vaccination among a community-based sample of women in the Philippines. Methods: Self-administered surveys were completed by 435 adult women. Intent to receive the HPV vaccine was assessed at low, moderate, and high vaccine price through responses on Likert scale items. The theory-grounded survey assessed attitudinal correlates, as well as sociodemographic, behavioral, and health-related characteristics. Results: Over half of the sample (54%) was accepting of HPV vaccination at the low price, but only 30% and 31% were accepting at the moderate and high price, respectively. Negative intent to receive the vaccine was significantly associated with women's indication that their mothers or partners were influential in their vaccination decisions. Perceived social support, access to transportation, perceived benefits of vaccination, perceived susceptibility to HPV, history of pap testing, and having been exposed to vaccine-promoting media were among factors independently associated with positive intent to receive the vaccine. Conclusions: HPV vaccine acceptance among Filipina women is contingent on affordable pricing. A successful vaccine initiative in the region must minimize structural barriers, foster familial and social support for vaccination, incorporate HPV education, and work within cultural norms.**

**Keywords:** Acceptance- attitudes - HPV vaccines - human papillomavirus - intention - Philippinas

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## Introduction

Among and within nations of the Asian Pacific, substantial variations in cervical cancer incidence and mortality exist (Garland et al., 2008; Parkin et al., 2008). Cervical cancer incidence in Malaysia, Sri Lanka, Vietnam, Indonesia, and the Philippines is among the highest in the world. The age-standardized cervical cancer incidence rate in the Philippines is 20.9 per 100,000, which is 30% higher than the world rate (Ferlay et al., 2004). Three of every four women diagnosed with cervical cancer in the Philippines are diagnosed at a late stage (Philippine Cancer Society, 2005); and for every two new cervical cancer cases diagnosed annually, one existing case will die within the year (Germar, 2004). Previous literature has noted that organized screening programs are difficult to implement and sustain in countries such as the Philippines due to a lack of resources (Department of Health Cervical Cancer Screening Study Group, 2001). Because of the high mortality rate of cervical cancer and the present inaccessibility of secondary prevention, an accessible primary prevention strategy is clearly critical and necessary.

In Southeast Asia, vaccination of 70% of the pre-adolescent female population against HPV-16 and -18 has the potential to reduce lifetime risk of cervical cancer by up to 57% (Goldie et al., 2008). The feasibility of achieving extensive population coverage will depend on cultural acceptability of the vaccine; however, few studies have assessed HPV vaccine acceptability in regions which are disproportionately affected by cervical cancer. A review of the female HPV vaccine acceptance literature conducted in 2007 identified fifty HPV vaccine acceptance studies from the US, Europe, Canada, and Australia and only three from developing countries (Brewer and Fazekas, 2007). More recently, a systematic review of the female HPV vaccine acceptance research from the Asia Pacific revealed that only nine of the region's twenty-seven countries had been represented by the existing literature (Young, 2010). This disparity represents a significant gap in cultural understanding and a substantial impediment to implementation of vaccine campaigns against cervical cancer in the region.

Although two HPV vaccines, Gardasil® and Cervarix®, have been approved for use in the Philippines, studies have not yet fully addressed the question of whether Filipina women will seek and receive this vaccine. Thus, the purpose of our study was to identify sociodemographic, behavioral, and attitudinal correlates to HPV vaccine acceptance at low, moderate, and high vaccine price increments among a community-based sample of women in the Philippines.

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## Materials and Methods

*Sample*

From June to July 2009, a convenience sample of females (n=435) were recruited from three communities in the Philippines' Central Visayan region. Recruitment flyers printed in the local language of Cebuano were distributed throughout the communities by community-based research assistants. The flyers invited women to take part in a "Women's Health Study" in which they could complete a questionnaire at various pre-established times and locations (e.g. local churches or community centers). To preserve anonymity, written informed consent was not obtained. In lieu of written consent, native-language study information sheets were distributed and read aloud by a community-based research assistant prior to survey sessions, after which, women were given the opportunity to decline participation, though none did. A small subsample of men were also recruited using a similar strategy and were administered modified data collection instruments, the findings from which are presented elsewhere (Young et al., in press).

Data collection consisted of an anonymous, cross-sectional survey. The development of the survey was preceded and informed by a qualitative phase of research involving four focus group discussions (n=33) with women ages 18 - 26. Recordings of the semi-structured discussions were translated into English and transcribed into a series of text documents that underwent thematic analysis (data not shown). After the qualitative formative research, the survey was created in English, translated into Cebuano, and confirmed through back-translation. The surveys were administered in group sessions with group sizes ranging from 21 to 100 participants. At each session, surveys were distributed to participants for self-administration. Simultaneously, a research assistant read the questionnaire item-by-item aloud to help ensure understanding and careful consideration. In anticipation of low HPV awareness, the survey began with an explanation that HPV was sexually transmitted and was a major cause of cervical cancer and genital warts. Following survey administration, women were compensated for their time and travel. The study protocol was approved by the University of Kentucky Institutional Review Board prior to implementation.

*Measures*

Measures of HPV vaccine acceptance have varied greatly across studies conducted in the Asia Pacific (Young, 2010). Traditionally, HPV vaccine acceptance has been assessed with a one-item measure that describes general intent to be vaccinated. Though one-item measures render a more concise interpretation, they may disguise important information influencing acceptance (Young, 2010). When presented with an ambiguous item, respondents may impose unique interpretations of the item and answer according to assumptions about price, timeframe, and various other contingencies. In response to these issues and to evidence from the formative qualitative data which revealed almost unanimous general acceptance of the vaccine, HPV vaccine acceptance in this study was measured using price-stratified items.The six acceptance measures were assessed using 7-point Likert scales, "If an HPV vaccine was made available in the next 12 months for (X price), how likely is it that you would get this vaccine?", with responses ranging from "very unlikely" to "very likely" and prices set to P400, P800, P1200, P1600, P2000, and P2400 (values given are in Philippine Pesos; P48.50≈$1USD)."

During analysis, outcome items were dichotomized and 'acceptance' was defined as responding either "likely" or "very likely". Women who indicated acceptance at either P400 or P800 were classified as acceptors at low price. Women who indicated acceptance at either P1200 or P1600 were classified as acceptors at moderate price and those who indicated acceptance at either P2000 or P2400 were classified as acceptors at high price.

The survey collected sociodemographic, behavioral, and health-related data (Table 1). Age, education, household size, income, and number of births were continuous, while religiosity, relationship status, and occupation were categorical. With the exception of a variable assessing condom use, sexual behavior items were open-ended, but were categorized upon bivariate analysis (categorization scheme in Table 1). Women were also queried about their history of pap testing and previous diagnoses of cancer, sexually transmitted infection (STI), and HPV through yes/no items. Women were also asked if they had already received the HPV vaccine.

The survey was based on the Health Belief Model (HBM) (Rosenstock, 1960) (e.g. perceived severity of and susceptibility to HPV-related conditions, and perceived benefits and risks of vaccination) and the Theory of Planned Behavior (TPB) (Azjen, 1985) (perceived behavioral control and perceived social norms). Each construct was evaluated as a subscale (items and response options are displayed in Table 2). The social norms measure was based on a modified concept of that posited in the TPB and addressed both injunctive and descriptive social norms. Only perceived severity and social norms subscales achieved adequate inter-item correlations to be entered in analyses as subscales (Cronbach's alpha 0.80 and 0.85, respectively). Cues to action (e.g. events that may influence vaccine acceptance) were examined through four "yes/no" items (Table 2).

Self-reported knowledge of HPV and genital warts was assessed through an index of three items which asked participants to rate their knowledge about HPV, genital warts, and cervical cancer ranging from "I knew everything" to "I knew nothing". An additional item was included to assess women's willingness to encourage their partner to receive the HPV vaccine, and another was included to determine if women who received the HPV vaccine would be more likely to engage in risky sexual behaviors. In a series of checklist-style items, women identified people and factors that would be influential in their vaccination decision (response options displayed in Table 3). Respondents were also asked to identify whom they would be most willing to trust to administer the vaccine. Two additional Likert scale items were included to explore preference for a female vaccine provider and for a gender-specific vaccination strategy.

*Analysis*

All respondents (n=435) were included in descriptive analysis. Thirty-nine respondents indicated having received the HPV vaccine and seven were missing responses; these cases were excluded during subsequent data analysis. Women who reported vaccination had significantly fewer years of education than did those who did not report vaccination (p=.006), but were otherwise demographically similar. Before data analysis on the remaining sample of 389 respondents, checklist-style items and categorical variables were recoded into dichotomous dummy variables. All Likert scale items including outcome variables were dichotomized. The perceived severity and social norms subscale scores were computed by averaging responses on items within the scales. Items for which greater than 10% of values were missing (denoted in Table 1) were excluded during analyses. Bivariate relationships of the correlates and outcomes were examined with independent samples t-tests and chi square tests. Correlates achieving significance (p<.05) with acceptance at low, moderate, and high price were entered into separate logistic regression models. The statistical software SPSS Version 17.0 (SPSS Inc., Chicago, IL) was used for data analysis.

## Results

The survey was completed by 435 women, with mean age of 24 years (range 18-52). A detailed description of demographic, behavioral, and health-related characteristics are displayed in Table 1. Over half (55%) reported that they "knew nothing" about HPV prior to the survey and over 76% reported they knew nothing about genital warts. Just under half (48%) reported no knowledge about cervical cancer. A description of attitudinal data is displayed in Table 2. Fewer than 10% of participants believed they were susceptible to HPV, cervical cancer, or genital warts, but most (≥ 60%) indicated that the conditions were severe. Most women believed the vaccine could offer protection against cervical cancer and genital warts, but fewer believed they would be better protected during sex. Just under half (49%), however, indicated that they would be more likely to engage in greater levels of sexual risk behavior if they were vaccinated. Vaccine-related fears were reported, the most common of which was fear of the needle and syringe. Of note, 29% indicated that they would fear getting the vaccine if it were given only to women. Respondents reported exposure to several cues of action. Approximately 55% had been exposed to media promoting the vaccine, 70% had received a recommendation from a healthcare provider to protect themselves against genital warts, and 76% reported that a healthcare provider had recommended the HPV vaccine to them. Because the survey did not specify that it was asking about exposure to cues of action *prior* to their participation in the survey, prevalence of exposure to cues of action may have been inflated.

Most women perceived strong social support for vaccination from friends, family, community members, and healthcare providers, but less than half believed that their partner would encourage them to receive the

**Table 1. Demographic, Behavioral, and Healthcare-related Characteristics of the Sample (n=435)**

| Characteristic | % (n) |
|---|---|
| Demographic factors | |
| Age in years - mean (SD) | 24.1 (5.3) |
| Years of education - mean (SD) | 8.8 (2.6) |
| No. of people in household - mean (SD) | 5.7 (2.5) |
| Daily income - mean (SD) | P35.6 (89.1) |
| (P48.50 ≈ $1USD) | |
| Number of births – mean (SD) | 1.9 (3.1) |
| Catholic | 92.8 (400) |
| Relationship status | |
| Married | 51.9 (222) |
| Single, not dating | 22.2 (95) |
| Dating one or more persons | 22.9 (98) |
| Legally separated/widowed | 1.6 (7) |
| Unemployed | 37.1 (141) |
| Behavioral factors | |
| Ever had sexual intercourse | |
| (not including oral sex) | 72.0 (313) |
| Age at first intercourse† - mean (SD) | 18.7 (3.05) |
| Male sexual partners in past 12 months† | |
| 1 | 75.1 (235) |
| ≥2 | 12.1 (38) |
| Sexual intercourse acts in the past 6 months†,‡ | |
| 0 | 17.8 (55) |
| ≥1 | 67.7 (212) |
| Times a condom was used during last 5 sexual intercourse events‡,§ | |
| 0 | 55.9 (175) |
| ≥1 | 18.2 (57) |
| Ever had sexual contact (including oral sex and mutual masturbation) | 34.0 (148) |
| Age at first sexual contact with another person¶ – mean (SD) | 17.2 (5.25) |
| Oral sex partners in the past 6 months ¶ | |
| 1 | 23.6 (35) |
| 2 | 9.5 (14) |
| Oral sex acts in the past 6 months ¶ | |
| 0 | 59.5 (88) |
| ≥1 | 27.7 (41) |
| Mutual masturbation partners in the past 6 months ¶ | |
| 1 | 14.9 (22) |
| ≥2 | 12.8 (19) |
| Mutual masturbation acts in the past 6 months ¶ | |
| 0 | 75.7 (112) |
| ≥1 | 10.8 (16) |
| Female sexual partners in past 12 months‡,†† | |
| ≥1 | 6.9 (23) |
| Health-related factors | |
| Ever diagnosed with cancer | 3.1 (13) |
| Ever diagnosed with a STI | 6.0 (25) |
| Ever diagnosed with HPV ‡ | 5.6 (22) |
| Ever been given a pap test | 9.4 (38) |
| Ever received a vaccine against HPV | 9.0 (39) |

Note: not all percentages total 100% due to missing values; † Among those who have ever had sexual intercourse (n=313); ‡ Greater than 10% of responses missing, excluded from bivariate and multivariate analyses; § Among those who reported at least five lifetime sexual intercourse encounters (n=232); ¶ Among those who had ever had sexual contact (including oral sex and mutual masturbation) (n=148); †† Among those who reported having ever had either sexual contact or sexual intercourse (n=331)

**Table 2. Affirmative Endorsement of Health Beliefs Regarding HPV and HPV Vaccination**

| Construct/Items | n (%) |
|---|---|
| Perceived susceptibility to HPV-related conditions | |
| If you did not receive a vaccine, how likely do you think you are to get HPV in your lifetime? † | 37 (9.5) |
| If you did not receive a vaccine, how likely do you think you are to get cervical cancer in your lifetime? † | 27 (6.9) |
| If you did not receive a vaccine, how likely do you think you are to get genital warts in your lifetime? † | 24 (6.2) |
| Perceived severity of HPV-related conditions | |
| How serious would it be if you got cervical cancer in your lifetime? ‡ | 244 (62.7) |
| How serious would it be if you got genital warts in your lifetime? ‡ | 233 (59.9) |
| How serious would it be if you got HPV this year? ‡ | 254 (65.3) |
| How serious would it be if someone you cared about got cervical cancer? ‡ | 275 (70.7) |
| If I had HPV, I would not be able to manage my daily activities. § | 52 (13.4) |
| Perceived benefits of HPV vaccination | |
| How much protection do you believe the HPV vaccine will offer against cervical cancer? ¶ | 321 (82.5) |
| How much protection do you believe the HPV vaccine will offer against genital warts? ¶ | 315 (81.0) |
| If I received the HPV vaccine, I would be better protected during sex. § | 224 (57.6) |
| Perceived risks/Fears associated with HPV vaccination | |
| I am afraid that the HPV vaccine has not been successfully tested on others. § | 112 (28.8) |
| I am afraid of the needle and syringe involved with getting vaccinated against HPV. § | 222 (57.1) |
| I am afraid that the HPV vaccine may have minor side effects such as fatigue or fever. § | 144 (37.0) |
| I am afraid that the HPV vaccine may have major side effects such as long term illness. § | 107 (27.5) |
| I am afraid of having to answer questions about my sexual history before receiving the HPV vaccine. § | 165 (42.4) |
| I trust the companies that make vaccines. §, †† | 340 (87.4) |
| I am afraid the vaccine would cause HPV. § | 65 (16.7) |
| I would fear getting the HPV vaccine if it were given only to women. §, ‡‡ | 275 (70.7) |
| I would be reluctant to receive the vaccine if I had to visit a healthcare provider. §, ‡‡ | 307 (78.9) |
| Cues to action | |
| Have you ever had a family member or close friend tell you that she had cervical cancer? | 27 (7.1) |
| Have you ever had a family member or close friend tell you that he/she had genital warts? | 23 (5.9) |
| Has a healthcare provider suggested that you protect yourself against genital warts? | 267 (70.8) |
| Have you seen TV commercials, radio announcements, advertisements, etc. promoting the HPV vaccine? | 207 (54.8) |
| Has a healthcare provider suggested that you receive the HPV vaccine? | 284 (75.5) |
| Perceived behavioral control over HPV vaccination | |
| If a vaccine were available and it required 3 doses, I would have time to visit the physician to get them. § | 236 (60.7) |
| If a vaccine were available and it required 3 doses, I would have transportation to visit the physician. § | 215 (55.3) |
| Whether or not I receive the HPV vaccine is completely up to me. § | 223 (57.3) |
| I am confident that if I wanted to receive the HPV vaccine, I could. § | 236 (60.7) |
| There would be barriers to my accepting the HPV vaccine if it became available within the next year. §, †† | 167 (42.9) |
| Perceived social norms surrounding HPV vaccination | |
| My [X] would think that getting the HPV vaccine is a good idea. § | |
| Friends | 285 (73.3) |
| Family | 270 (69.4) |
| Community | 260 (66.8) |
| Healthcare provider | 282 (72.5) |
| Spiritual/religious leader | 242 (62.2) |
| If a free vaccine was available, my friends would be likely to get the HPV vaccine. § | 311 (79.9) |
| If I was in a relationship with someone, they would encourage me to get the HPV vaccine. § | 179 (46.0) |
| If I was in a relationship and a free HPV vaccine was available, I would encourage him/her to get it.§, ‡‡ | 303 (77.9) |

† Affirmative endorsement: Very Likely/Likely; ‡ Affirmative endorsement: Very serious/Serious; § Affirmative endorsement: Strongly Agree/Agree; ¶ Affirmative endorsement: Complete protection/Much protection; †† Item reversed for inclusion in subscale and assessment of Cronbach's alpha; ‡‡ Not included in subscale score for construct

vaccine. Over three-fourths of women would encourage their partner to receive the vaccine. Just over half of the sample indicated that they would have transportation (55%) and time (61%) to receive multiple vaccine doses. Approximately half of the participants (57%) believed they would independently have control over their vaccination decision and 61% were confident that they could receive the vaccine if they desired.

*Influential factors and people in decision about HPV vaccination*

Table 3 lists descriptive data regarding influential people and factors in women's thinking about vaccination. The vast majority indicated that their mother (73%) and/or husband/boyfriend/partner (64%) would be influential in their vaccination decision. Most women identified that protection from HPV (82%) and cervical cancer (77%) would influence their decision to receive the vaccine. Nearly two-thirds of women (65%) indicated that the need to stay healthy for their family would be important. Vaccine safety was also an influential factor in many women's decision (58%).

Gender was clearly demonstrated to play a role in who women trust to provide them with the HPV vaccine. Female physicians were overwhelmingly the most trusted provider. Over 68% of women reported they would most

**Table 3. Influential Factors and People in Respondents' Decision about HPV Vaccination**

| Construct/Items | n (%) |
|---|---|
| Influential people | |
| Mother | 276 (73.0) |
| Husband/boyfriend/partner | 240 (63.5) |
| Father | 191 (50.5) |
| Healthworker | 121 (32.0) |
| Friends | 115 (30.4) |
| Siblings | 103 (27.2) |
| Grandparents | 100 (26.5) |
| Spiritual/religious leader | 50 (13.2) |
| Influential factors | |
| Protection from HPV | 313 (81.5) |
| Protection from cervical cancer | 294 (76.6) |
| Staying healthy for my family | 250 (65.1) |
| Vaccine safety | 222 (57.8) |
| Protecting sexual partners from infection | 183 (47.8) |
| Having time to visit the clinic | 140 (36.6) |
| Cost/price | 134 (34.9) |
| Number of doses required | 114 (29.7) |
| Transportation to/from clinic | 98 (25.5) |
| Need to answer questions on sexual history | 83 (21.7) |
| My sexual orientation | 62 (16.1) |
| Level of my sexual activity | 60 (15.6) |

Note: Response options were not mutually exclusive

trust a female physician compared to 1.3% for a male physician. Some women (14%) indicated that a female barangay health worker would be the most trusted provider, compared to only 0.8% for a male barangay health worker. Most women (71%) also indicated that they would be more willing to receive the vaccine if the healthcare provider administering it was female.

*HPV vaccine acceptance and correlates*

Over half of the participants (54%) indicated acceptance at low vaccine price (i.e. at P400 or P800), but only 30% and 31% were accepting at moderate and high price, respectively. Various factors were related to vaccine acceptance at low, moderate, and high price in bivariate analyses (Table 4). Notably, items based on the TPB constructs of perceived social support and perceived behavioral control were fairly consistent in their association with acceptance across all price increments. The HBM construct of perceived susceptibility to HPV also reached significance in its association with vaccine acceptance at each price increment.

Results of multivariate analyses are displayed in Table 5. Women who identified their mother as an influential person in their vaccination decision had 73% lesser odds

**Table 4. Significant (p<0.05) Bivariate Correlates to Vaccine Acceptance at three Price Increments**

| Characteristic | Low price | Moderate price | High price |
|---|---|---|---|
| Demographic, behavioral, and health-related factors | | | |
| Age | | | • |
| Number of people living in home | • | | |
| Had two or more sex partners | • | | |
| Ever had Pap test | | | • |
| Constructs based on Health Belief Model | | | |
| Perceived severity of HPV and related conditions | •** | | |
| Perceived susceptibility to HPV | • | •* | • |
| Perceived susceptibility to cervical cancer | •* | • | |
| Perceived susceptibility to genital warts | | • | • |
| Perceived risks/fears associated with vaccination | | | |
| Fear that the vaccine has not been tested well | •** | •** | |
| Fear of the needle and syringe | •** | • | |
| Fear of minor side effects | • | • | |
| Fear of answering questions about sex history | •* | | |
| Fear that the vaccine would cause HPV | | •* | •* |
| Trust in the companies that make the vaccines | • | | |
| Fear of gender-specific vaccination strategy | • | •* | • |
| Reluctant to see healthcare provider to receive vaccine | •* | | |
| Believes that vaccine would provide better protection during sex | •** | | |
| Self-reported knowledge about genital warts | | •* | |
| Received suggestion from healthcare provider to protect themselves against genital warts | | • | |
| Provider has suggested receipt of HPV vaccine | | | • |
| Exposure to media promoting HPV vaccine | | • | • |
| Constructs based on Theory of Planned Behavior | | | |
| Perceived social support | •** | •** | •** |
| I would encourage my partner to receive the vaccine | •* | | • |
| Personal control over vaccination decision | •** | •* | • |
| Confidence in ability to obtain vaccine | •** | | •* |
| Have time to receive vaccine | •** | •** | •** |
| Have transportation to receive vaccine | •** | •** | •** |
| Belief that there would be barriers to acceptance | • | •** | •** |
| Influential factors and people | | | |
| Desire to protect sexual partners | • | | |
| Vaccine safety | • | | |
| Number of doses required | | • | |
| Husband/boyfriend/partner | | • | • |
| Mother | • | | |

* p<0.01, **p<0.001

**Table 5. Significant Multivariate Correlates to HPV Vaccine Acceptance at Three Vaccine Price Increments**

| | AOR† | 95% CI | p-value |
|---|---|---|---|
| Low Price | | | |
| Indicates that mother is influential in vaccination decision | 0.27 | 0.14 - 0.55 | <0.001 |
| Believes that vaccine would provide better protection during sex | 1.97 | 1.01 - 3.84 | 0.047 |
| Perceives positive social support for vaccination | 1.44 | 1.07 - 1.93 | 0.016 |
| Fears the needle and syringe involved with vaccination | 2.79 | 1.52 - 5.13 | 0.001 |
| Moderate Price | | | |
| Indicates that partner is influential in vaccination decision | 0.47 | 0.26 - 0.86 | 0.014 |
| Perceives that she is susceptible to HPV | 2.85 | 1.01 - 8.04 | 0.047 |
| Has access to transportation to receive vaccine | 2.38 | 1.15 - 4.95 | 0.020 |
| Perceives barriers to obtaining the HPV vaccine | 2.58 | 1.44 - 4.64 | 0.001 |
| Has received a suggestion from a healthcare provider to protect herself against genital warts | 2.08 | 1.02 - 4.25 | 0.044 |
| High Price | | | |
| Has lifetime history of pap testing | 2.75 | 1.16 - 6.51 | 0.021 |
| Has time to receive the vaccine | 2.82 | 1.30 - 6.13 | 0.009 |
| Has been exposed to media promoting the HPV vaccine | 1.99 | 1.09 - 3.63 | 0.026 |
| Perceives barriers to obtaining the HPV vaccine | 2.38 | 1.35 - 4.21 | 0.003 |

AOR, adjusted odds ratio; CI, confidence interval; Only bivariate correlates that were significant at p<.05 (indicated by a "•" in Table 4) were entered into their respective logistic regression model and all variables which were entered were retained in the model after forward entry; † Adjusted odds ratios are adjusted for all other variables in their respective models

of accepting vaccination at a low price than did women who did not identify their mothers as influential (AOR: 0.27, CI: 0.14 - 0.55). The belief that the HPV vaccine would provide better protection during sex was positively associated with vaccine acceptance at low price, as was perceived social support. Fear of the needle and syringe involved with vaccination was also associated with acceptance, but in the direction contrary to intuition. Women who indicated fear of the needle and syringe had 2.8 times higher odds of accepting vaccination than did their counterparts not expressing this fear.

The regression model for acceptance at moderate price revealed a different set of correlates. Women whose husband/boyfriend/partner was influential in their vaccination decision had 53% lower odds of accepting the vaccine than did women whose partner was not influential (AOR: 0.47, CI: 0.26 - 0.86). On the other hand, factors positively associated with acceptance included access to transportation, perceived susceptibility to HPV, and having received a suggestion from a healthcare provider to protect oneself against genital warts. Unexpectedly, women who believed that there would be barriers to their ability to receive the vaccine had higher odds of accepting vaccination than did those who did not anticipate barriers.

At high vaccine price, four variables were independently associated with vaccine acceptance. History of pap testing, exposure to media promoting the HPV vaccine, and having time to receive the vaccine were positively associated with acceptance, controlling for other variables in the model. As in the moderate price model, women who believed that there would be barriers to their ability to receive the vaccine had higher odds of accepting vaccination than did those who did not anticipate barriers.

## Discussion

The findings from this sample of Filipina females indicate that HPV vaccine acceptance and its correlates are heavily influenced by price. At low cost, over 50% of women indicated that they would be likely to receive the vaccine. However, when the price increased, less than one-third of women indicated that they would be likely to receive the vaccination. Price has been cited as a major barrier to implementation of HPV vaccine initiatives in the Asia-Pacific region (Garland et al., 2008b). Several solutions have been proposed to lower cost and increase sustainability (Andrus et al., 2008), but further research is needed to reveal the most efficient and effective mode of delivering the vaccine in the Philippines. Notably, the study revealed that correlates to HPV vaccine acceptance differed according to price. Thus, despite requiring more delicate interpretation, this finding provides some indication that the price-stratified outcome measures were appropriate in unveiling more detailed information about acceptance than would have been captured by the traditional one-item measure.

The findings from this study demonstrate that a socially-comprehensive, family-centered approach to HPV vaccine initiatives in the region may be necessary to achieving widespread coverage. The majority of women reported that their mother, partner, or father would be influential in their HPV vaccine decision. At low vaccine price, participants whose mothers were influential in the decision to be vaccinated had 73% lesser odds of accepting the vaccine than women whose mother was not influential. At moderate vaccine price, women whose partner was influential in their decision had less than half the odds of accepting vaccination than did their counterparts. These findings underscore the importance of involving parents, partners, and other social referents in discussions surrounding HPV and HPV vaccination and of recognizing them as recipients of messages in social marketing campaigns for vaccination.

Few HPV vaccine acceptance studies from the Asian Pacific have been grounded in a theoretical-framework, and those which have were based on the HBM or ecological model.(Young, 2010) The findings from this study reveal that the TPB may also be an effective theoretical framework for understanding vaccine acceptability. Several correlates related to participants'

perceived control over HPV vaccination (e.g. access to transportation, available time, etc) and perceived social support were significantly related to acceptance.

Two cues to action, exposure to vaccine-promoting media and receipt of a suggestion from a healthcare provider to obtain protection from genital warts, were significantly correlated with acceptance. The strength of the association between these factors and vaccine acceptance suggests that cues to action from healthcare providers and media may have the potential to significantly impact women's willingness to be vaccinated. Perceived vaccination risks and barriers were also associated with vaccination, but in the direction contrary to that which was expected. One potential explanation is that women who are more accepting of vaccination are more acquainted with the healthcare system, more aware of the pain associated with certain procedures, and more cognizant of the possible risks and barriers. Nevertheless, further research is needed to explore these associations.

While this study broadens understanding of HPV vaccine acceptance, it is not without limitations. The use of a convenience sample and reliance on women's self-report could have presented participation and information biases, respectively. Also, the low inter-item correlations within four of the six subscales is a study limitation, resulting in a large number of bivariate tests and a possible inflation of Type 1 error. However, the ratio of cases to the number of independent variables in each model did not violate common recommendations (Hosmer and Lemeshow, 2000) and due to the exploratory nature of this study, model building restrictions could have potentially limited the study's ability to raise questions for future research. The primary limitation of this study was that it was only able to assess intent to be vaccinated rather than actual uptake of the vaccine series. Correlates to intent may be dissimilar to those of uptake; therefore, future research may benefit from incorporating an uptake component in which correlates to actual receipt of multiple vaccine doses can be assessed.

Despite limitations, this study offers valuable insight into HPV vaccine acceptance and, to our knowledge, was the first of its kind conducted among a community-based sample of women in the Philippines. The findings demonstrate that affordable pricing will be critical to the success of an impactful HPV vaccine initiative in the region. The findings also underscore the necessity of a comprehensive, family-based vaccination campaign that targets individuals who influence women's willingness to be vaccinated. Although more research is needed to understand factors involved with vaccine uptake, it is clear that the effective implementation of a vaccine initiative in the Philippines will require a combination of innovative, cost-effective, and community-tailored strategies.

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